Regional Operational Plan SF.2A.2013.19

Chinook and Coho Salmon Escapement Monitoring, Anchorage Management Area, 2013-2015

by

Dan Bosch

November 2013

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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by

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Alaska Department of Fish and Game, Division of Sport Fish, Anchorage

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Division of Sport Fish

November 2013

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Signature Page

Project Title	Chinook and coho salmon escapement monitoring, Anchorage management area, 2013--2015
Project leader(s):Dan Bosch	
Division, Region and Area	Sport Fish, Region II, Anchorage Management Area
Project Nomenclature:	
Period Covered	2013 – 2015
Field Dates:	June - October
Plan Type:	Category I

Approval

Title	Name	Signature	Date
Project leader	Daniel Bosch	Daniel E Bosch	7/02/13
Research Coordinator	Jack Erickson		18-Nov-13

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PURPOSE

Aerial and ground surveys have been used to assess Chinook (*Oncorhynchus tshawytcha*) and coho salmon (*O. kisutch*) escapement in the Anchorage Management Area since 1958 (Miller & Bosch 2007; Table 1). Surveys provide biologists with subjective information regarding the abundance and distribution of Chinook and coho salmon. Annual surveys are essential to the management of local Chinook and coho salmon streams for several reasons. Collected information can be used to : 1) liberalize or closure of sport fisheries, 2) assessment of run strength, 3) estimate run timing, 4) detect escapement trends, 5) evaluate changes in spawning distribution, 6) develop future management strategies by detecting a surplus or identifying problems related to escapement, 7) evaluate of escapement goals, 8) ensure broodstock needs are met and.

The Anchorage area supports extensive and diverse recreational fisheries for Chinook and coho salmon. This area is bounded to the north by the Eklutna River and to the south by Ingram Creek (Figure 1). Communities within this area include Anchorage, Eagle River, Birchwood, Chugiak, Peters Creek, Eklutna, Indian/Bird, and Girdwood.

Chinook salmon fisheries in the Anchorage Management Area include Ship Creek, Eagle River, and Campbell Creek. The largest Chinook salmon sport fishery is hatchery produced and occurs on Ship Creek. The Ship Creek sport fishery is centrally located in the heart of downtown Anchorage providing a unique opportunity for anglers in an urban setting. Wild Chinook salmon fisheries include Eagle River and a youth only fishery on Campbell Creek.

Coho salmon fisheries in the Anchorage Management Area include centrally located urban opportunities from Ship and Campbell Creek to scenic remote fisheries at Twentymile and Placer Rivers in Turnagain Arm that require the use of a river boat. The largest coho salmon sport fisheries in the Anchorage Management Area include the three hatchery enhanced streams; Bird Creek, Campbell Creek and Ship Creek. Drainages that support wild coho salmon include Twentymile and Placer River.

This operational plan details the qualitative evaluation of Chinook and coho salmon stocks in selected drainages.

OBJECTIVES

1) Count the number of visible Chinook salmon, by foot survey twice a week, in Ship Creek beginning the second week of June above the Chugach Association Power Plant (CAPP) dam. In accordance with the Statewide stocking plan a minimum of 750 Chinook salmon need to be counted to ensure that brood stock and viewing needs are met. Bi-weekly surveys will be conducted until 750 Chinook salmon have been counted above the CAPP dam or Jul 13th.
2) Count the number of visible Chinook salmon, by foot survey, in Bird Creek, Campbell Creek, Eagle River (South Fork and Meadow Creek), and Rabbit Creek by conducting at least one weekly survey of each stream between the second week of July and August 1st
3) Count the number of visible coho salmon, by foot survey twice a week, in Ship Creek beginning the second week of August above the CAPP dam. In accordance with the Statewide stocking plan a minimum of 1,000 coho salmon need to be counted to ensure that brood stock and viewing needs are met.

4) Count the number of visible coho salmon, by foot survey, in Campbell Creek, Bird Creek, and Rabbit Creek by conducting at least one survey of each stream between 15 September and 15 October.

In addition to these objectives, there is one secondary objective to be accomplished:

1) Count the number of visible sockeye, pink, and chum salmon while conducting Chinook and coho salmon stream surveys.

METHODS

The ground-based, foot/float, and aerial surveys will be conducted by department staff and will be timed to coincide with peak spawning periods as determined through a combination of the timing of past escapement surveys, inseason reports of spawning activity, and preference for optimal water levels and viewing conditions (Table 2).

Acceptable counting conditions can vary significantly from stream to stream and are based on the professional judgment of the crew leader. Conditions that are taken into consideration include sunlight (direct, indirect, presence of shadows), wind conditions, precipitation sufficient to obscure visibility, water clarity and depth (sufficient to observe all underwater structures in the deepest pools).

Survey routes have been be standardized for each stream using easily identifiable landmarks to identify starting and stopping points as well as tributary and stream branch confluence locations. During standard survey route coverage, acceptable water levels and viewing conditions, the count from a stream survey will be interpreted as a minimum number of spawning salmon escaping to that stream and will therefore be viewed only as an index of total escapement. If a stream is sampled more than once during the year the peak survey will be used as the index count. Such indices will be assumed to be positively related to total escapement (but in an unknown manner) and comparable among years for each stream. Trends of usable indices over years will therefore be assumed to reflect trends in actual escapements.

CHINOOK SALMON

Ship Creek

There currently is no Chinook salmon escapement goal for the Ship Creek stocked fishery. However, foot surveying the creek is necessary because it is an important broodstock source, and it is also a large Chinook salmon sport fishery. Records of escapement have been collected in this system since 1960. Stream surveys start at the Elmendorf Air force Base dam and end at the CAPP dam. Hatchery and Sport Fish management personnel require a minimum of 750 Chinook salmon to be counted by foot survey in the creek between the Elmendorf Dam and the CAPP dam for natural spawning, fish viewing, and providing for broodstock goals (Loopstra 2007) (Table 3, Figure 2). Escapement will be controlled inseason by opening and closing the gates on the dam weekly to provide anglers harvest opportunity and to ensure the department's goals are met.

Bird Creek

There currently is no Chinook salmon escapement goal or Chinook salmon sport fishery for the Bird Creek drainage. The management objective and goal for wild stocks of Chinook salmon considered too small to support a harvestable surplus is to maintain historical Chinook salmon escapement levels, continue natural production, and provide viewing opportunities (Miller & Bosch 2007). Chinook salmon escapement surveys have been conducted annually on Bird Creek since 1989. Escapement indices of spawning Chinook salmon into Bird Creek will be obtained with foot surveys (Table 3, Figure 3).

Campbell Creek

The current lower-bound SEG for the Campbell Creek drainage is 380 Chinook salmon. In 2005 the legislature created a youth only fishery, age-15 and under, for Chinook salmon on Campbell Creek. The creation of this fishery provides youth anglers the opportunity to harvest Chinook salmon where no sport fishery had previously been allowed. Chinook salmon escapement surveys have been conducted annually on Campbell Creek since 1989. Escapement indices of spawning Chinook salmon into Campbell Creek will be obtained with foot and float surveys (Table 3, Figures 4 and 5).

Eagle River

There currently is no Chinook salmon Escapement Goal for the Eagle River drainage. Angler effort is low on the glacially occluded main stem Eagle River and is restricted to a small area near the Glenn Highway campground. The fishery is open to Chinook salmon fishing for four 3-day weekends (Saturday, Sunday, Monday) beginning Memorial weekend to provide harvest opportunity while ensuring wild stocks are conserved. Chinook salmon escapement surveys have been conducted annually on the South Fork Eagle River since 1989 and Meadow Creek since 2001. Escapement indices of spawning Chinook salmon into the South Fork and Meadow Creek tributaries of Eagle River will be obtained with foot surveys (Table 3, Figure 6).

Rabbit Creek

There currently is no Chinook salmon Escapement Goal or sport fishery for the Rabbit Creek drainage. The management objective and goal for wild stocks of Chinook salmon considered too small to support a harvestable surplus is to maintain historical Chinook salmon escapement levels, continue natural production, and provide viewing opportunities at Potters Marsh (Miller & Bosch 2007). Escapement indices of spawning Chinook salmon into Rabbit Creek will be obtained with foot surveys (Table 3)

COHO SALMON

Ship Creek

There currently is no coho salmon escapement goal for the Ship Creek stocked fishery. However, foot surveying the creek is necessary, because it is an important broodstock source and it is also a large coho salmon sport fishery. Records of escapement have been collected in this system since 1960. Stream surveys start at the Elmendorf Air force Base Dam and end at the CAPP dam. Hatchery and Sport Fish management personnel require that a minimum of 1,000 coho salmon are counted by foot survey in the creek between the Elmendorf Dam and the CAPP

dam for natural spawning, fish viewing, and providing for broodstock goals (Loopstra 2007) (Table 3, Figure 2).

Bird Creek

There currently is no coho salmon escapement goal for the Bird Creek drainage. The limited information available for natural coho salmon production in Bird Creek suggests that few coho salmon spawn in the system (Miller and Bosch 2007). The Bird Creek coho salmon fishery was established to provide additional angler opportunity to the Anchorage Management Area. The current stocking goal is 100,000 coho salmon smolt with an expected return of about 5,000 adult fish generating 7,500 angler-days of annual sport fishing opportunity (Loopstra 2007). Adult coho salmon that escape the intense fishery at the mouth of the creek will be enumerated by a single foot survey. This survey will start at the second bridge crossing Penguin Creek and continue downstream to the Bird Creek confluence. The survey will continue upstream Bird Creek approximately 1 mile to the waterfalls. Fish cannot get upstream of this barrier. The survey will end by counting coho downstream of the confluence of Penguin Creek and Bird Creek to Turnagain Arm (Table 3, Figure 3).

Campbell Creek

There currently is no coho salmon escapement goal for the Campbell Creek drainage. In 2007 the ADF&G Upper Cook Inlet salmon escapement goal committee dropped the Sustainable Escapement Goal (SEG) for the Campbell Creek drainage as coho salmon returns to the drainage are predominately hatchery fish, with brood stock from Ship Creek (Fair et al. 2007). Campbell Creek has been stocked with coho salmon since 1992, with the first return in 1993. These stocked fish contribute to both commercial fisheries in Cook Inlet and sport fisheries in Campbell Creek. The current adult coho salmon returns are a mix of wild and hatchery stocks. The current stocking goal is 75,000 coho salmon smolt with an expected return of about 3,500 adult fish generating 7,500 angler-days of annual sport fishing opportunity (Loopstra 2007). Coho salmon escapement surveys have been conducted annually on Campbell Creek since 1990. Escapement indices of spawning coho salmon into Campbell creek will be obtained with foot and float surveys (Table 3, Figures 4 and 5).

Rabbit Creek

There currently is no coho salmon Escapement Goal or sport fishery for the Rabbit Creek drainage. The management objective and goal for wild stocks of coho salmon considered too small to support a harvestable surplus is to maintain historical coho salmon escapement levels, continue natural production, and provide viewing opportunities at Potters Marsh (Miller & Bosch 2007). Escapement indices of spawning coho salmon into Rabbit Creek will be obtained with foot surveys (Table 3)

DATA COLLECTION

Observers will wear polarized sunglasses to enhance visibility into the water during a survey. In addition, survey observers will carry two handheld counters. One of these handheld counters will be used to record all live salmon encountered and the other counter will be used to record all dead salmon encountered. Observers will record the handheld counter readings in write-in-the-rain field notebooks upon reaching a waypoint on a given stream. Observers will then check and remind each other to zero their counters before beginning to survey the next stream segment.

Additional data to be recorded in the field notebooks during each survey will include the following:

1. Stream name and the corresponding reach surveyed (including all tributaries). Survey reaches will be identified using easily identified landmarks.
2. Date.
3. Type of survey.
4. Weather condition.
5. Stream level (NOAA website, http://aprfc.arh.noaa.gov/index_rivs.php).
6. Water visibility.
7. Observer comments on noted factors or variables that may have affected survey results.

DATA REDUCTION

The survey data will be summarized by stream reach and recorded on data forms (Appendix A1.). The survey conditions, total numbers of live and dead salmon counted in each reach and stream that were previously recorded in field notebooks will be recorded in an annual Anchorage Area Escapement spreadsheet.

Summarized index counts will be presented in the Area Management Report for the Recreational Fisheries in the Anchorage Area Regulatory Area in tables, including historical survey data. Final edited copies of the MS Excel spreadsheets along with a data map describing the data files will be archived on the Division of Sport Fish intranet site at http://docushare.sf.adfg.state.ak.us/.

Caution should be when interpreting these data. Ground and aerial survey indices can be good indicators of general trends in fish distribution and abundance, but not for developing estimates of such.

SCHEDULE AND DELIVERABLES

Data collected (May – October) will be analyzed (November) and reported in an ADF&G Area Management Report for the Recreational Fisheries of Anchorage, Alaska in 2016 prior to the next board of fish meeting.

RESPONSIBILITIES

Dan Bosch, Area Management Biologist, Project Leader, ADF&G.

> Duties: Oversees project and serves as budget manager. Assists in preparation of the project operational plan. Collect survey index data. Co-author project technical report and Area Management report.

Mike Thalhauser, Assistant Area Management Biologist. Assists in preparation of the project operational plan. Collect survey index data. Co-author project technical report and Area Management report.

Adam Craig, Biometrician III.

Duties: Review operational plan; provide statistical support for any data analysis.

REFERENCE CITED

Fair, L. F., T. M. Willette, J. W. Erickson, R. J. Yanusz, and T. R. McKinley. 2010. Review of salmon escapement goals in Upper Cook Inlet, Alaska, 2011. Alaska Department of Fish and Game, Fishery Manuscript Series No. 10-06, Anchorage.

Loopstra, D. 2007. Statewide stocking plan for recreational fisheries, 2007-2011. Alaska Department of Fish and Game, Division of Sport Fish, Sport Fish Hatchery Program, Online Report, Anchorage.

Miller, M. G. and D. Bosch. 2007. Area management report for the recreational fisheries of Anchorage, 2005 and 2006. Alaska Department of Fish and Game, Fishery Management Report No. 07-53, Anchorage.

TABLES AND FIGURES

Table 1.–Chinook and coho salmon survey streams, Anchorage Management Area.

Ship Creek	California Creek
Bird Creek Drainage	Twenty Mile River Drainage
Campbell Creek Drainage	Portage Creek Drainage
Eagle River (South Fork & Meadow Creek)	Placer River Drainage
Rabbit Creek	

Table 2.–Chinook and coho salmon streams and drainages, target survey type and dates, Anchorage Management Area.

Species	Stream (Drainage)	Survey Type	Target Survey Date
Chinook	Ship Creek	Foot	15 Jun – 15 July
	Bird Creek	Foot	15 Jul – 30 July
	North Fork Campbell Creek	Foot	15 Jul – 30 July
	South Fork Campbell Creek	Foot	15 Jul – 30 July
	Float Reach Campbell Creek	Float	15 Jul – 30 July
	Eagle River (South Fork & Meadow Creek)	Foot	15 Jul – 30 July
	Rabbit Creek	Foot	15 Jul – 30 July
coho	Ship Creek	Foot	Last two weeks in August
	Bird Creek	Foot	15 Sept – 15 Oct
	North Fork Campbell Creek	Foot	15 Sept – 15 Oct
	South Fork Campbell Creek	Foot	Day after North Fork
	Float Reach Campbell Creek	Float	Day after South Fork
	Rabbit Creek	Foot	15 Sept - 15 Oct

Table 3.–Ship Creek, Bird Creek, Campbell Creek, Eagle River, and Rabbit drainage reaches, start and stop ground survey landmarks, Anchorage Management Area.

Stream Reach		Start Landmark	Stop Landmark
Ship Creek			
1	Hatchery	Elmendorf AFB Dam	Reeves Blvd
2	Viking Drive	Reeves Blvd	Post Rd
3	Lower	Post Rd	CAPP Dam
Bird Creek			
1	Penguin Creek	Upstream Bridge	Penguin Ck/Bird Ck confluence
2	Bird Creek upstream	Penguin Ck/Bird Ck confluence	Bird Creek Waterfalls
3	Bird Creek downstream	Penguin Ck/Bird Ck confluence	Creek mouth at Turnagain Arm
Campbell Creek			
1	North Fork	Gas line	Beaver Dam
	North Fork	Beaver Dam	Campbell Airstrip Rd
	North Fork	Campbell Airstrip Rd	NF/SF Confluence (Piper St)
2	South Fork	Bridge on Spencer Loop	Iron Bridge at Airstrip
	South Fork	Iron Bridge at Airstrip	Tour of Anchorage Trail Bridge
	South Fork	Tour of Anchorage Trail Bridge	NF/SF Confluence (Piper St)
	South Fork (Main Stem)	NF/SF Confluence (Piper St)	Folker Street
3	Main Stem (float)	Folker Street	Taku Campbell Park
Eagle River			
1	South Fork	South Fork	Confluence with Eagle River
2	Meadow Crk.	Eagle River Rd.	Confluence with Eagle River
Rabbit Creek			
1	Lower Rabbit Crk.	Rabbit Crk Rd.	Seward Highway

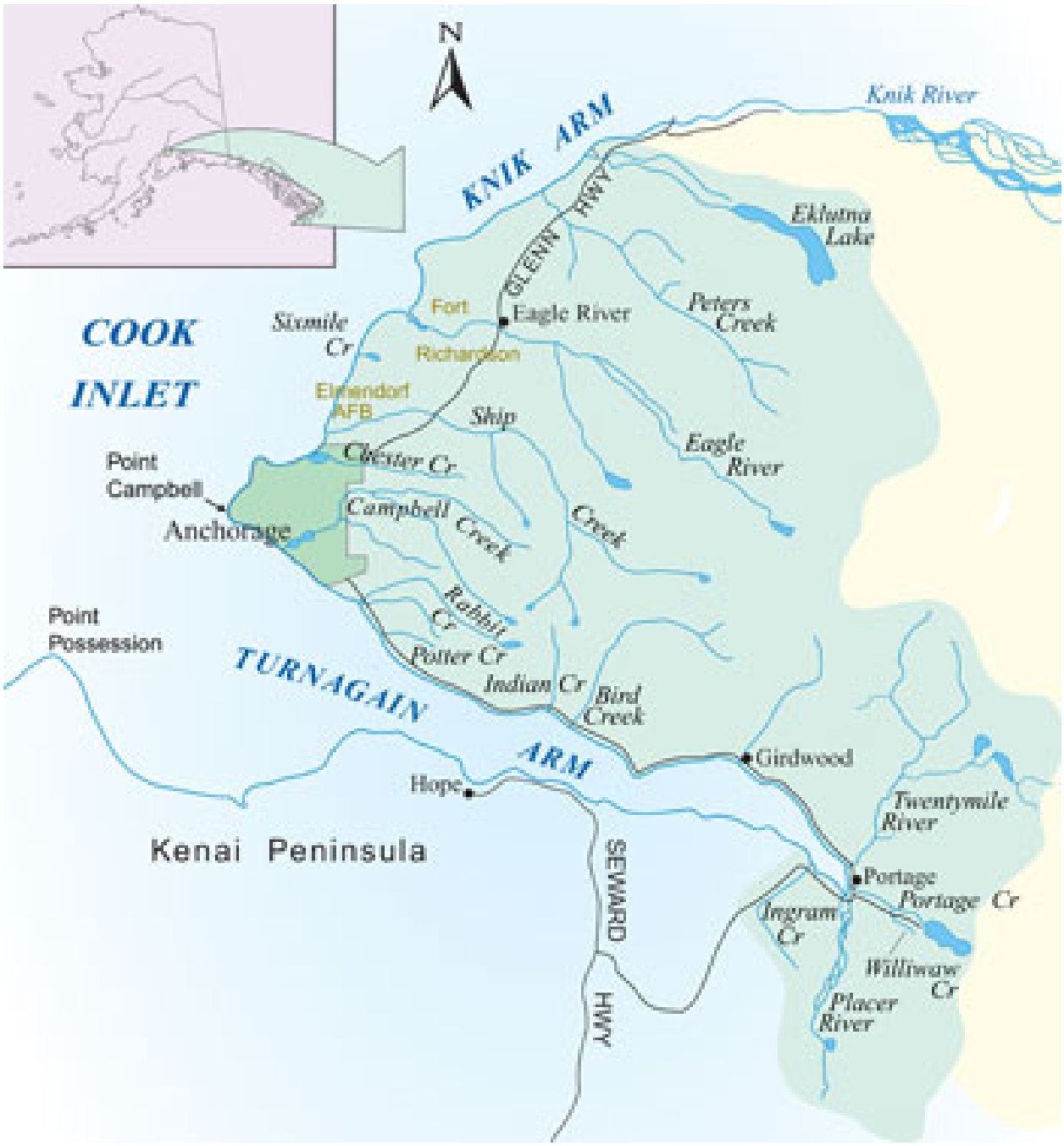

Figure 1.–Anchorage Management Area, Alaska.

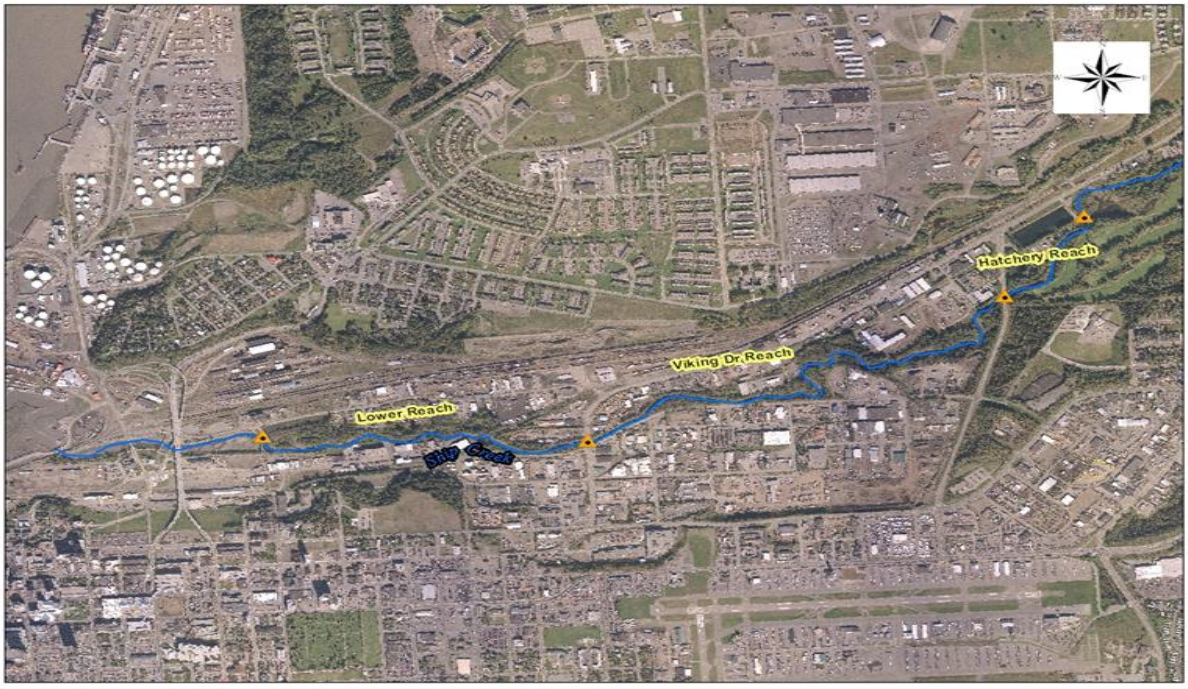

Figure 2.–Ship Creek, reaches and landmarks, Anchorage Management Area, Alaska.

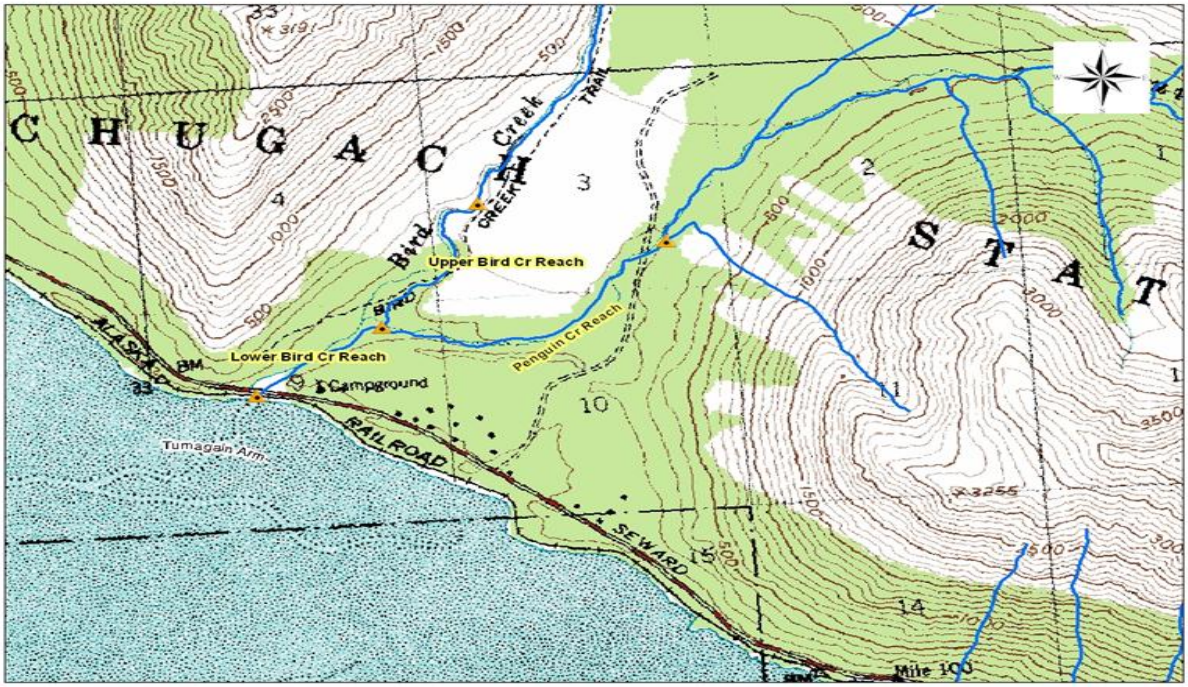

Figure 3.–Bird Creek, reaches and landmarks, Anchorage Management Area, Alaska.

Figure 4.–Campbell Creek, North and South Fork, reaches and landmarks, Anchorage Management Area, Alaska.

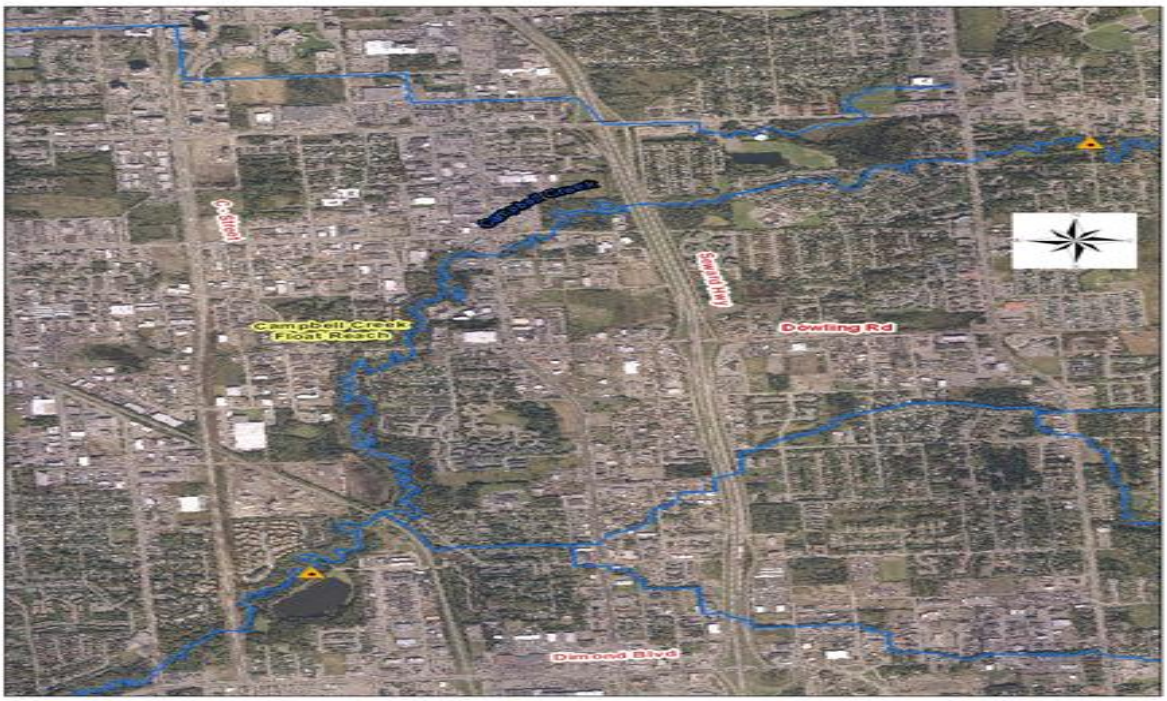

Figure 5.–Campbell Creek, float reach, Anchorage Management Area, Alaska.

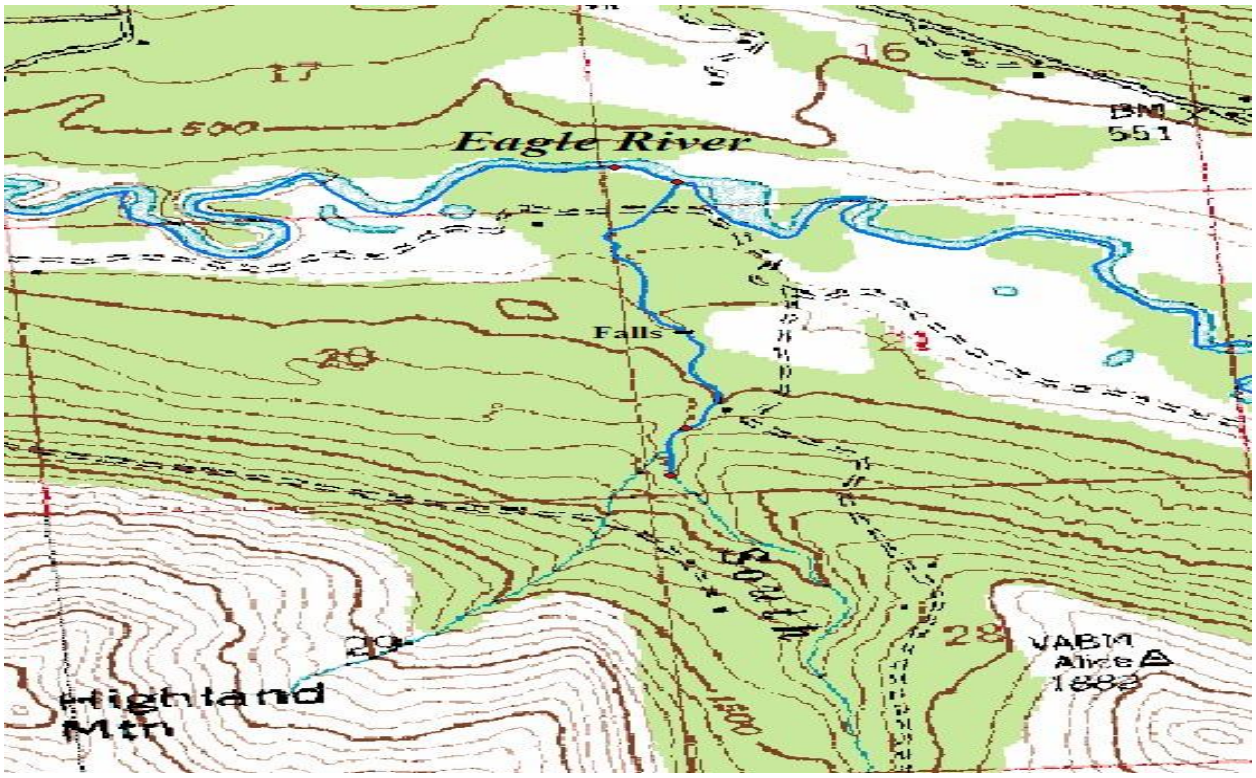

Figure 6.–Eagle River drainage, reaches and landmarks, Anchorage Management Area, Alaska.

APPENDIX A

Appendix A1.–Stream survey data form, Anchorage Management Area.

Anchorage Area Survey Data From						**Page:**
Observers:	**Weather:**				**Pilot:**	
	General Location: Anchorage Area					
	Stream Surveyed:				**Aircraft Type:**	
Date:	**Stream Gauge Level:**					
Total Time:						
		Numbers of Fish Observed -			**Live/Dead**	
Stream Reach Surveyed	**Visability**	**King**	**Sockeye**	**Coho**	**Chum**	**Pinks**

VISIBILITY	**Survey Type**	**Remarks - Observations**
E=Excellent	Aerial	
G=Good	Foot	
F=Fair	Float	
P=Poor	Other	